

Notice of Allowability

Application No.

10/072,536

Applicant(s)

DREWNIAK ET AL.

Examiner

Henry S. Hu

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment of December 12, 2003.
2. ☒ The allowed claim(s) is/are 1-22.
3. ☒ The drawings filed on 12 December 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date December 12, 2003
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

1. Applicants' amendment with new drawing filed on December 12, 2003 was received.

The limitation of **Claims 1, 4, 8, 11, and 15** were amended on "polymer blend" with additional limitation of "comprising a non-functionalized homopolymer or copolymer of propylene, and either (a) copolymer of ethylene and an alpha-olefin with an optional diene; or (b) a styrene copolymer of ethylene or propylene; or a mixture thereof". **New independent Claim 22** was added by using a specific clay of smectite. **Claim 12** was amended to further recite a preferred embodiment where the *alpha*-olefin comprises octane. The examiner confirms that no new matter was added.

With respect to specification objection, the Applicants have replaced paragraphs beginning at page 11 at line 4 with new paragraph to correct the errors as mentioned by the examiner. **With respect to the drawing objection, the Applicants have submitted three new drawing sheets to replace Fig. 1, Fig. 3a, Fig. 3b, and Fig. 4, the new drawing figures are approved now by the examiner.** With respect to claim objection, phrase of "the modified melt strength to the melt strength before modification" and "optional components" have been corrected specifically. The examiner thereby withdraws the specification objection, drawing objection, claim objection and 112-second paragraph rejection in the previous Office Action dated September 8, 2003. **Claims 1-22 are pending now.**

Art Unit: 1713

2. Claim rejections under 35 USC 102 and/or 103 in the previous Office Action dated September 8, 2003 are now removed for the reasons given in paragraphs 3-9 thereafter.

Allowable Subject Matter

3. Claims 1-22 are allowed.

4. The following is an examiner's statement of reasons for allowance: The above claims 1-22 are allowed over the closest references:

5. The limitation of amended parent **Claim 1** of present invention relates to *a method of manufacturing an article which comprises: (A) **providing a polyolefin/clay nanocomposite masterbatch** formed from 0-99 wt% of polyolefin, 1-100 wt% of functionalized polyolefin, 10-50 wt% of organically modified clay; (B) **melt blending 1-30 wt% of nanocomposite masterbatch and 70-99 wt% of a polyolefin blend comprising a non-functionalized homopolymer or copolymer of propylene, and either (a) copolymer of ethylene and an alpha-olefin with an optional diene; or (b) a styrene copolymer of ethylene or propylene; or a mixture thereof** to form a final polyolefin blend and to ensure sufficient exfoliation of the organically modified clay into the final polyolefin blend so that the **melt strength of the final polyolefin blend is greater than the melt strength of the polyolefin blend before modification with the nanocomposite masterbatch; and (C) **forming the article** using the final polyolefin blend.** The other parent*

Art Unit: 1713

Claims 4, 8, 15 and 22 (new) relate to Claim 1 but with narrowed limitations. See other limitations of Claims 2-3, 5-7, 9-14 and 16-21.

6. In view of the Applicants' amendment, parent **Claim 1** of present invention has been amended to carry a "polymer blend" with additional limitation of "comprising a non-functionalized homopolymer or copolymer of propylene, and either (a) copolymer of ethylene and an alpha-olefin with an optional diene; or (b) a styrene copolymer of ethylene or propylene; or a mixture thereof". With respect to 102 or 103 rejection for Claims 1-20, the reference **Usuki** only discloses a method of **producing a composite clay material and its use in blending**. In blending with an organo onium ion **with a clay mineral**, Usuki et al. further disclose one method using the main guest molecules having a **polar functional group** to be incorporated into an interlayer section of the clay mineral (see Fig. 1B); one alternating method using the above-mentioned guest molecules with molecular length not more than the organo onium ion, as well as a second guest molecule having no polar group with molecular length not less than the organo onium ion. Usuki et al. furthermore disclose such obtained clay composite may be **further mixed with the rubber material**. The function of the above-mentioned main or first guest molecule is equivalent to the claimed functionalized polyolefin, while the rubber material or the second guest molecule is equivalent to the claimed polyolefin blend. The blending of an organo onium ion with a clay mineral through ionic bonding in the initial step is equivalent to using an organically modified clay as specifically demonstrated in Figures 1A, 1B, and 2-5.

Art Unit: 1713

With respect to other 102 or 103 rejection for Claims 1-21, the reference **Qian** only discloses a method of **producing a nanocomposite concentrate composition comprising a layered silicate material, a matrix polymer comprising a polyolefin and a maleic anhydride-modified polyolefin, and coupling agents such as an organo onium ion is very useful in blending a non-polar and low-polarity oligomers or polymers with a clay mineral.** Qian et al. further disclose on examples 1-8 the detailed intercalation process through a **masterbatch** as well as the molding process to manufacture articles. It is noted that the **blending of coupling agent such as an organo onium ion with a clay mineral through ionic bonding in the initial step is equivalent to using an organically modified clay as specifically demonstrated in examples 1-8.**

7. In a close examination, **both Usuki and Qian fails to teach or fairly suggest on melt blending step by using a claimed polymer blend with “a non-functionalized homopolymer or copolymer of propylene, and either (a) copolymer of ethylene and an alpha-olefin with an optional diene; or (b) a styrene copolymer of ethylene or propylene; or a mixture thereof”.**

It is noted both Usuki and Qian have only used a polymer blend such as “comprising a polyolefin oligomer or polymer and a maleic anhydride-modified polyolefin oligomer or polymer” to mix with the masterbatch on column 4, line 26-28; abstract, line 10-13). It should be also noted that Hasegawa has recognized that in order to get best result in blending to form a nanocomposite, it is preferred to use a minimum amount (about 7 % by wt) of maleic anhydride-modified polypropylene (see Qian’s column 4, line 50-55).

With respect to other 103 rejection for **Claim 21**, the secondary reference **Kawasumi** only discloses that protonated amino acid such as 4-amino-n-butyric acid ion can be used as a swelling agent in the preparation of composite material, such a composition will allow the layered silicate material constituted the clay material being connected to the polymer through ionic bonding in a dispersion medium.

It is noted that Claim 21 is dependent from parent Claim 1. It is also noted that new independent **Claim 22** is relating to parent Claim 1 but using a specific clay of smectite. With the same reason mentioned above, Usuki, Qian and Kawasumi, in combination or alone fails to teach or fairly suggest the limitations of melt blending step as using a claimed polymer blend with “a non-functionalized homopolymer or copolymer of propylene, and either (a) copolymer of ethylene and an alpha-olefin with an optional diene; or (b) a styrene copolymer of ethylene or propylene; or a mixture thereof”.

Additionally, the present invention has shown in examples along with some comparative examples for unexpected results in obtaining polyolefin/clay nanocomposite articles (see pages 19-27 for **examples 1-12** along with its comparative control examples 1-10, and **Tables 1-V**). Therefore, all the above-mentioned references, in combination or alone, does not teach or fairly suggest the limitations of present invention.

Art Unit: 1713

8. After further examination and search, the examiner found the following prior art did not teach the claimed limitation: **Bagrodia et al. (US 6,337,046)** only disclose a process for producing containers from polyester/clay composites for food and beverages (abstract, line 1-4). Although clays may be treated with organic agents, polymers or oligomers (column 4, line 27-60), no polyolefins or modified polyolefins are disclosed (column 6, line 30 – column 7, line 59). Therefore, Bagrodia does not teach or fairly suggest the limitations of present invention.

9. The key issue, regarding the limitations of melt blending step as using a claimed polymer blend with “a non-functionalized homopolymer or copolymer of propylene, and either (a) copolymer of ethylene and an alpha-olefin with an optional diene; or (b) a styrene copolymer of ethylene or propylene; or a mixture thereof”, cannot be overcome by any or the combination of the above references, therefore, the present invention is novel.

10. As of the date of this office action, the examiner has not located or identified any reference that can be used singularly or in combination with another reference including the above references to render the present invention anticipated or obvious to one of the ordinary skill in the art. Therefore, the five independent and parent **Claims 1, 4, 8 15 and 22** are allowed for the reason listed above. Since the prior art of record fails to teach the present invention, the remaining pending **Claims 2-3, 5-7, 9-14 and 16-21** are passed to issue.

11. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue

Art Unit: 1713

fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

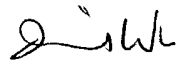
12. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Henry S. Hu whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306 for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Henry S. Hu

February 20, 2004


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